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General Mills, Inc.
Mechanical Division

**ENGINEERING RESEARCH & DEVELOPMENT
DEPARTMENT**

**2003 EAST HENNEPIN AVENUE
MINNEAPOLIS 13, MINN.**

FINAL REPORT
CONTRACT NO. Nonr 875(00)

ANNEX II

Prepared for
The Office of Naval Research
Washington 25, D. C.

This document has been reviewed in accordance with
OPNAVINST 5510.17, paragraph 5. The security
classification assigned to it is correct.

Date: 9/7/54 K. E. Wright
By direction of
Chief of Naval Research (Code 44)

Report No. 1308

10 June 1954

Prepared by: Keith C. Giles

Approved by:

Cledo Brunetti
Cledo Brunetti, Director

GENERAL MILLS, INC.
Mechanical Division
ENGINEERING RESEARCH AND DEVELOPMENT
2003 E. Hennepin Ave.
Minneapolis 13, Minn.

1-465

FINAL REPORT CONTRACT Nonr 875(00)

ANNEX II

I. AIMS

On 29 May 1952, Contract Nonr 875(00) between General Mills, Inc. and the Office of Naval Research was amended to provide for the launching of "Skyhook" plastic balloons to carry scientific instruments to high altitudes. Scientific payloads were supplied by the Evans Signal Corps Engineering Laboratories. General Mills, Inc. supplied "Skyhook" balloons, balloon controls and safety equipment. Engineering services for launching and telemetering altitude information were also supplied by General Mills technical personnel.

II. WORK ACCOMPLISHED

Flight work on this project was carried out in July and August of 1953 and in May of 1954.

Six flights were made in the Summer of 1953, flights number 1000, 1038, 1042, 1045, 1047 and 1048. In all cases, 85-foot "Skyhook" balloons were used to carry the following equipment to high altitudes.

1. The scientific payload, an ozone counter, supplied by the Evans Signal Corps Engineering Laboratories.
2. Release timer, a clock mechanism set to fire a squib, severing the instruments from the balloon at a predetermined time.
3. Parachute, to return the instruments safely to earth after being released from the balloon.
4. Radio transmitter, pressure actuated to transmit pressure altitude data.

5. Cameras facing both up and down.
6. Safety switch, set to release the payload if balloon should float below 30,000 ft.

In addition to these standard items, two flights, number 1000 and 1038, carried a radio release, a device designed to separate the load from the balloon on radio command actuated from the ground or from an aircraft. Two flights, 1000 and 1045, failed prematurely; flight 1000 from premature radio release (improperly assembled by field technicians), and flight 1045 from balloon failure while rising. One flight, 1042, failed on reaching ceiling due to a restricted appendix. The remaining three flights performed successfully.

Two flights were made in May of 1954, flights number 1138 and 1139. These two flights were similar to those made in 1953 in that they utilized 85-foot "Skyhook" balloons and carried release timers, safety timers, pressure-sensitive radio transmitters, and parachutes, all of which are standard balloon flight accessories. Rather than carrying an ozone counter as the main load, the primary objective was to obtain meteorological trajectory data for analysis by the Meteorological Branch of the Evans Signal Corps Engineering Laboratories. Down cameras were used for trajectory and altitude purposes. Additional altitude information was derived from barographs and altitude telemeters. A secondary load was provided on each flight. Flight 1138 carried a dew point hygrometer for New York University, and on 1139 a cosmic ray counter for the University of Minnesota was flown. In addition, several "hitch-hike" payloads were carried aloft. Both flights performed successfully.

Flight data on all flights are presented in the next section.

General Mills, Inc. is happy to have been able to work with the personnel of Evans Signal Corps Engineering Laboratories and the Office of Naval Research in carrying out these high altitude scientific experiments and hopes all payloads performed satisfactorily and met with success.

DATA FROM EXPERIMENTAL CODE SONDE 1746 KC

ALTITUDE IN THOUSANDS OF FEET	ELAPSED TIME IN HOURS	CENTRAL STANDARD TIME
0	0800	0745 A
1000	0800	0745 A
2000	0800	0745 A
3000	0800	0745 A
4000	0800	0745 A
5000	0800	0745 A
6000	0800	0745 A
7000	0800	0745 A
8000	0800	0745 A
9000	0800	0745 A
10000	0800	0745 A
11000	0800	0745 A
12000	0800	0745 A
13000	0800	0745 A
14000	0800	0745 A
15000	0800	0745 A
16000	0800	0745 A
17000	0800	0745 A
18000	0800	0745 A
19000	0800	0745 A
20000	0800	0745 A
21000	0800	0745 A
22000	0800	0745 A
23000	0800	0745 A
24000	0800	0745 A
25000	0800	0745 A
26000	0800	0745 A
27000	0800	0745 A
28000	0800	0745 A
29000	0800	0745 A
30000	0800	0745 A
31000	0800	0745 A
32000	0800	0745 A
33000	0800	0745 A
34000	0800	0745 A
35000	0800	0745 A
36000	0800	0745 A
37000	0800	0745 A
38000	0800	0745 A
39000	0800	0745 A
40000	0800	0745 A
41000	0800	0745 A
42000	0800	0745 A
43000	0800	0745 A
44000	0800	0745 A
45000	0800	0745 A
46000	0800	0745 A
47000	0800	0745 A
48000	0800	0745 A
49000	0800	0745 A
50000	0800	0745 A
51000	0800	0745 A
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97000	0800	0745 A
98000	0800	0745 A
99000	0800	0745 A
100000	0800	0745 A
101000	0800	0745 A
102000	0800	0745 A
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110000	0800	0745 A
111000	0800	0745 A
112000	0800	0745 A
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122000	0800	0745 A
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151000	0800	0745 A
152000	0800	0745 A
153000	0800	0745 A
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157000	0800	0745 A
158000	0800	0745 A
159000	0800	0745 A
160000	0800	0745 A
161000	0800	0745 A
162000	0800	0745 A
163000	0800	0745 A
164000	0800	0745 A
165000	0800	0745 A
166000	0800	0745 A
167000	0800	0745 A
168000	0800	0745 A
169000	0800	0745 A
170000	0800	0745 A
171000	0800	0745 A
172000	0800	0745 A
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FLIGHT NO 1000
FLOWN 5 AUGUST 1953
FOR 05007 STROUD
LOAD ON BALLOON 178.7
FREE LIFT 34.5 = 10.2
BALLOON TYPE MATTERIAL NUMBER WEIGHT
85 ARL E294 4 1512

PREPARE RADIO RELEASE 0818.5 C.S.T.

IMPACT, 2 MI W
OF MINN AIRPORT
0824.5 C.S.T.

I D.K. 8-28-53

APPROVED K.P.

0750 0800

A - 2145-A

DATA FROM EXPERIMENTAL CODE SONDE 1746 KC

DATA FROM EXPERIMENTAL CODE SONDE 1746 KC

DATA FROM EXPERIMENTAL CODE SONDE 1746 KC

© 5M 216 BAROGRAPH DATA

DURATION TO RELEASE - 4 HRS 12 MIN

THEORETICAL CEILING

100

90

80

70

60

50

40

30

20

10

0

AVERAGE RATE OF RISE
576 FT/MIN
TO 91,900 FT

RADIO RELEASE
10
1105.4 C.S.T.

FLIGHT NO	1038	ALTITUDE IN THOUSANDS OF FEET	50
FOR	8-5007-STROUD		
FLOWN	16 JULY 1953		
LOAD ON BALLOON	174#		
FREE LIFT	36# = 11%		
BALLOON TYPE	NUMBER	MATERIAL WEIGHT	200
85A	6	ARL #294 15#	
LOAD WAS OZONE COUNTER			
			400
			300
			200
			100
			0

ELAPSED TIME IN HOURS	3	D.K.	7-20-53	5
LAUNCH SITE	U OF MINN AIRPORT	APPROVED	MINN	
D653 C.S.T.				
0700	0800	1000	1100	1200
0900				

CENTRAL STANDARD TIME

GENERAL MILLS, INC., LUMINARIA RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINN.

JUN 17 1954

DATA FROM EXPERIMENTAL CODESONDE 1746 KC

100

THEORETICAL CEILING

PRESSURE ALTITUDE

80
BALLOON BURST WHEN PRESSURIZED
DUE TO RESTRICTED APPENDIX

60

AVERAGE RATE OF RISE
539 FT/MIN
TO 97,000 FT

40

ALTITUDE IN THOUSANDS OF FEET

FLIGHT NO 1042

FLOWN 7 AUGUST 1953
FOR 85007 STRUD
LOAD ON BALLOON 184#
FREE LIFT 34# 10%
BALLOON TYPE NUMBER MATERIAL WEIGHT
85 3 ARL #294 148#

20

0

PRESSURE IN MILLIBARS
100
200
300

LAUNCH SITE
U OF MINN AIRPORT
0648 C.S.T.

IMPACT, 5 MI NE
HIEVILLE, MINN
AT APPROXIMATELY 1012 C.S.T.

4 D.K. 8-25-53

APPROVED

0620 0700 0800 0900 1000 1100

ELAPSED TIME IN HOURS

CENTRAL STANDARD TIME

A - 2141-A

DATA FROM EXPERIMENTAL CODESONDE 1742 KG

THEORETICAL CEILING

106

OBSERVED LOAD RELEASE, 1052 C.S.T.

10

ALTITUDE IN THOUSANDS OF FEET	ELAPSED TIME IN HOURS	CENTRAL STANDARD TIME	LAUNCH SITE U OF MINN AIRPORT OCT 1 C.S.T.	IMPACT SITE FLYING CLOUD AIRPORT MINNEAPOLIS, MINN 1436 C.S.T.
0	0	0800	0700	1700
10	1	0900	0800	1800
20	2	1000	0900	1900
30	3	1100	1000	2000
40	4	1200	1100	2100
50	5	1300	1200	2200
60				
70				
80				
90				
100				
110				
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CHARLES FLUORING COMPANY, INC.
Box 2024 - Minneapolis, Minn.

D. A. C. E. F. I.

DATA FROM EXPERIMENTAL COESEONE, 1742KC

PHENOMENAL CEILING

100

90

RATE OF RISE
232 FT/MIN
TO 93,800 FT

FLIGHT NO. 1048

25

FOR 8 500' STRAND
FLIGHT 20 AUG 1953

LOAD ON BALLOON 170#

FREE LIFT 46# = 14%

BALLOON TYPE NO. 5 MATERIAL

85 WT. 182# ARI# 284

80

70

60

50

40

30

20

10

0

PRESSURE IN MILLIBARS

10

20

30

40

50

60

70

80

90

100

A-21205-A

100

200

300

400

500

600

700

800

900

1000

1100

1200

1300

LAUNCH SITE
U OF MINN AIRPORT
0738 C.S.T.

IMPACT, 2 MI SE
MONTECITO, MINN
1238 C.S.T.

ELAPSED TIME IN HOURS
D.R. 11-30-53

5

4

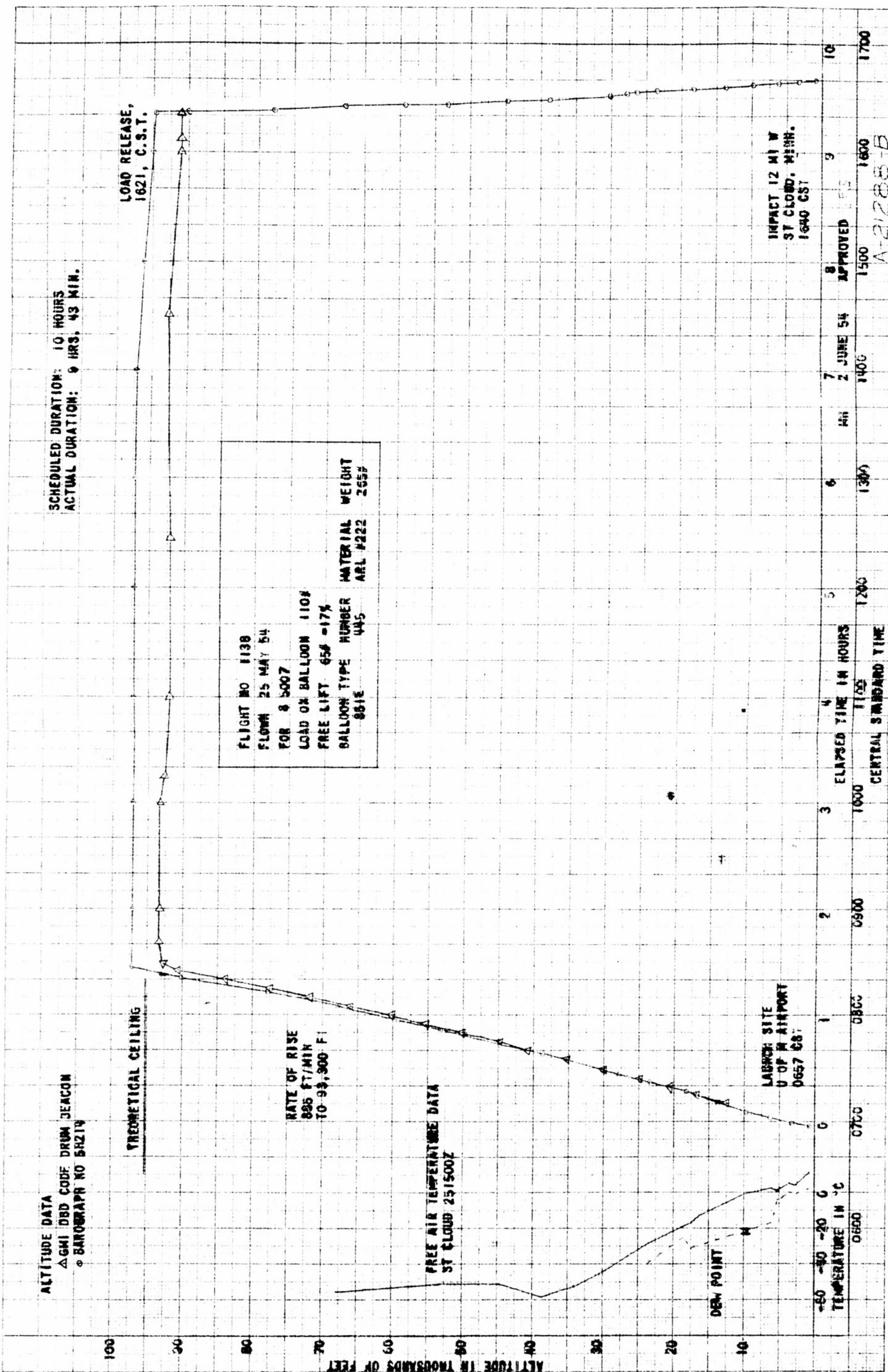
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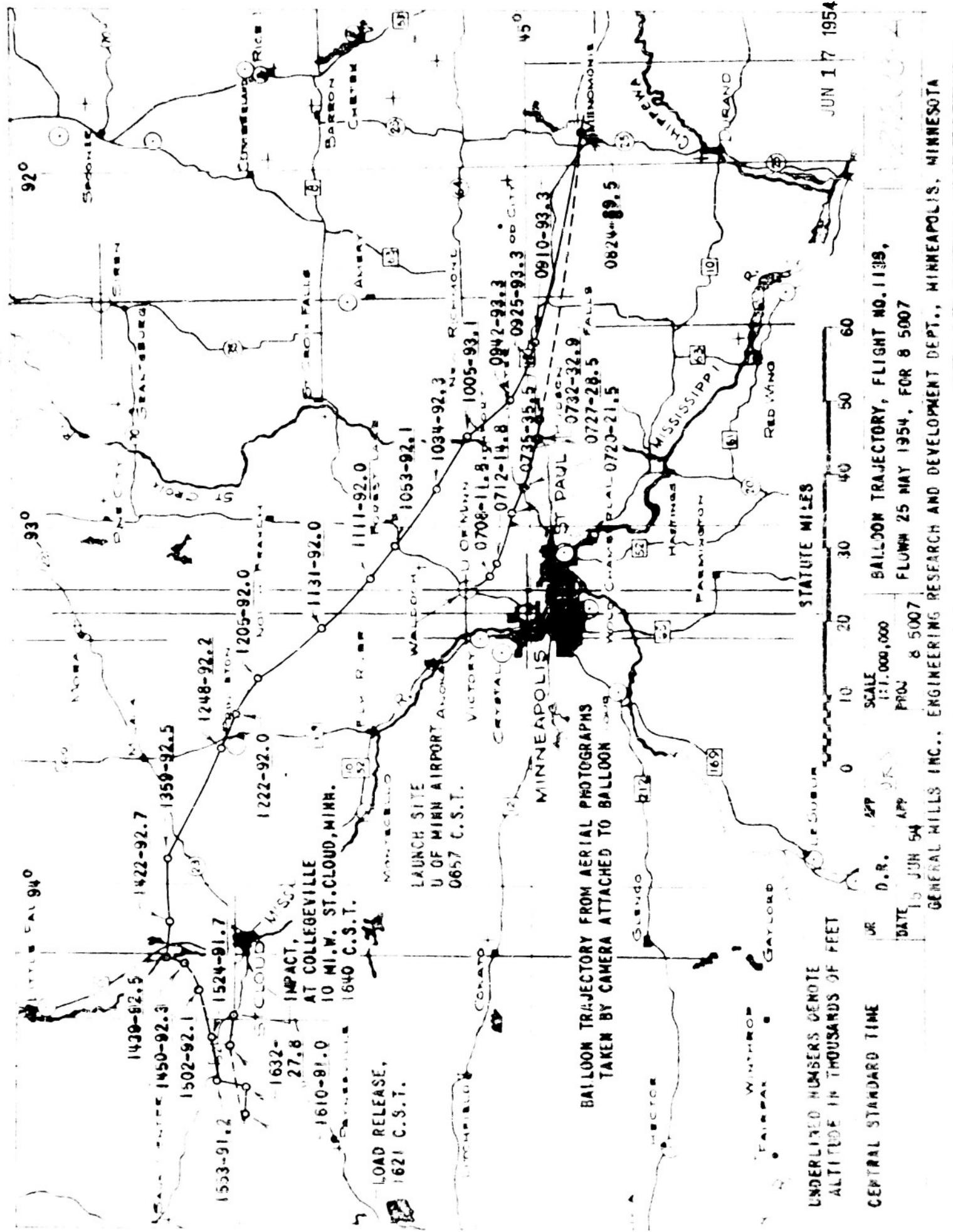
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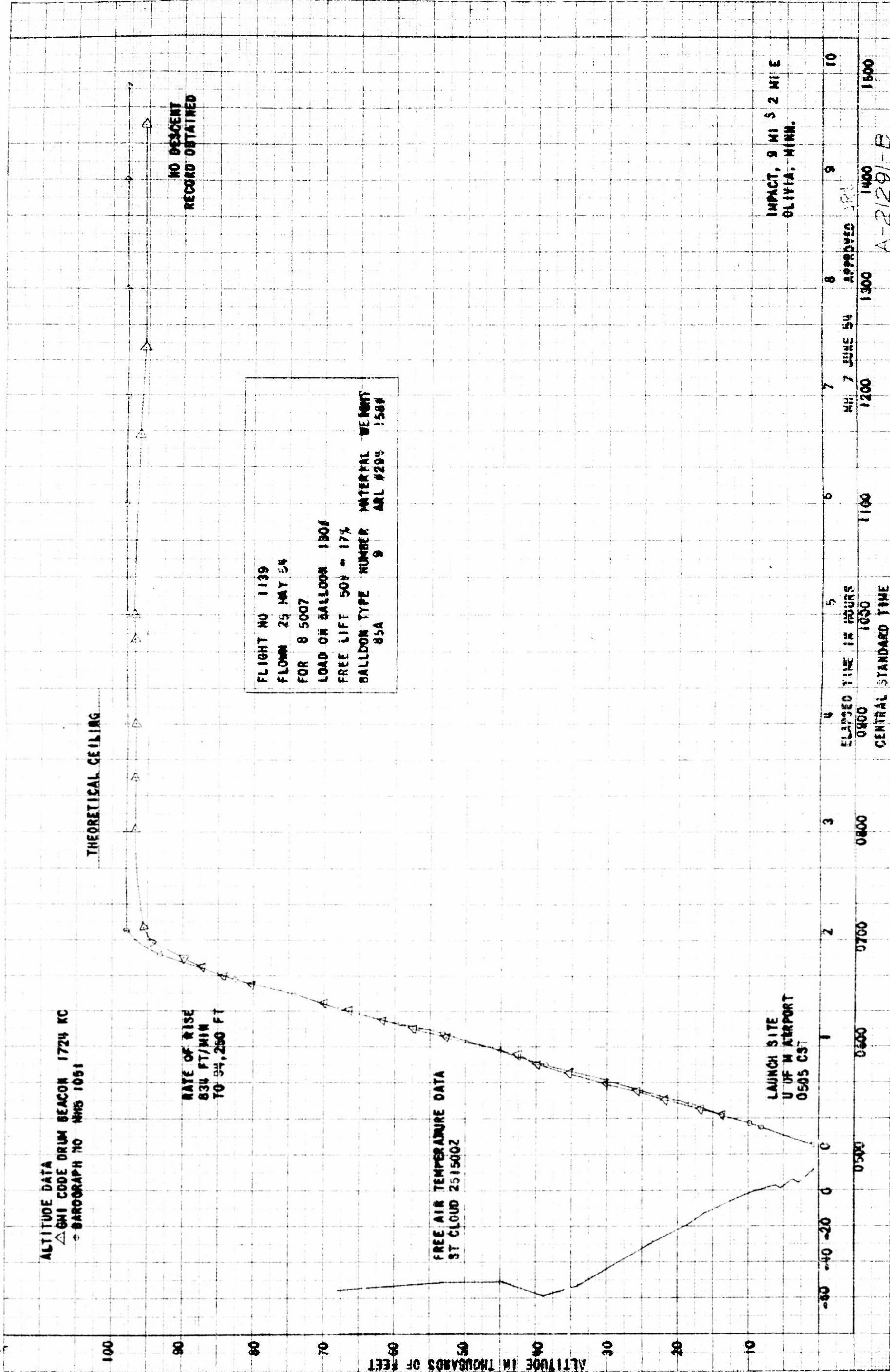
JUN 17 1954



JUN 17 1954

GENERAL MILLS, INC., ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT, MINNEAPOLIS, MINN.





GENERAL MILLS, INC. ENGINEERING RESEARCH AND DEVELOPMENT DEPARTMENT: MINNEAPOLIS, MINN.

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